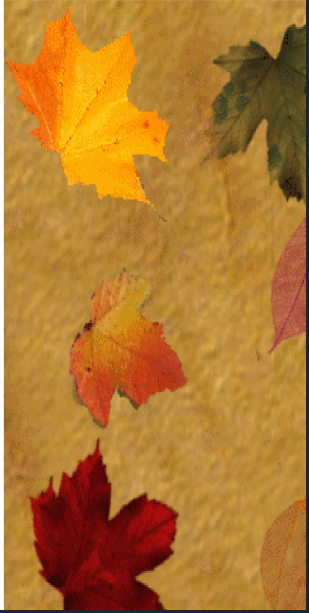


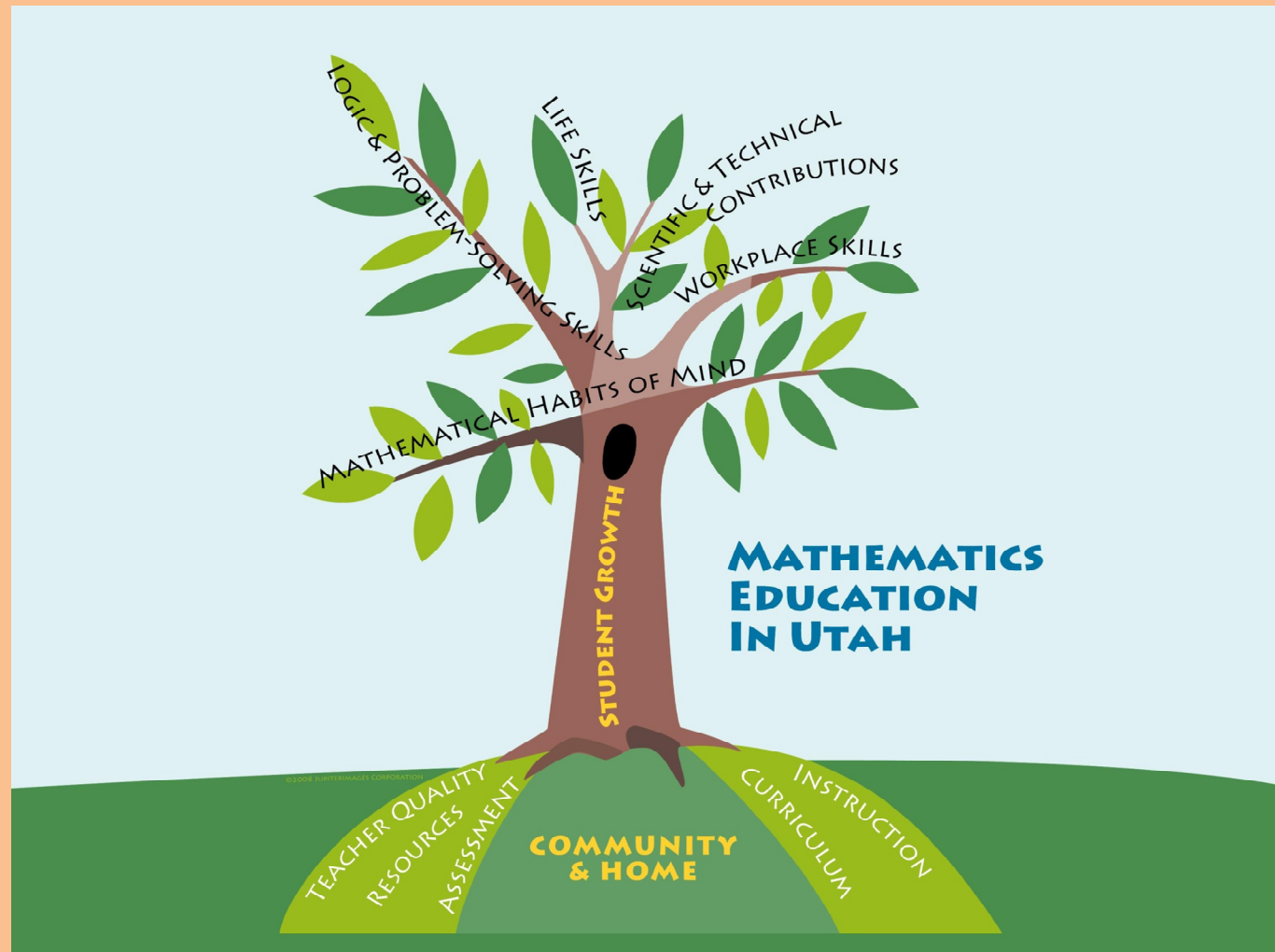
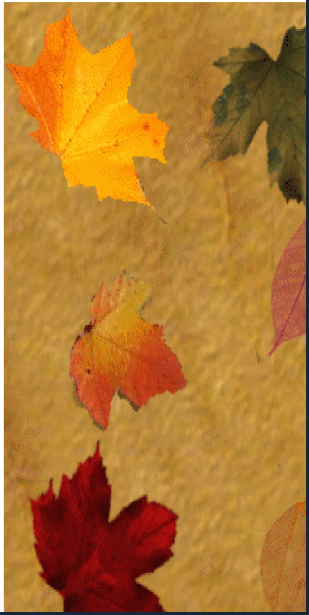
# The Common Core for Mathematics

October 21, 2010

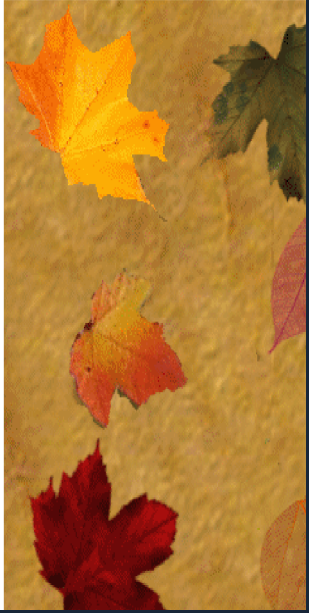
Elementary Principals Math and  
Science Academy



Imagine that in the middle of the night, while you are sleeping, a miracle happens and all the problems associated with mathematics education are resolved. When you walk into a classroom, what will you see?

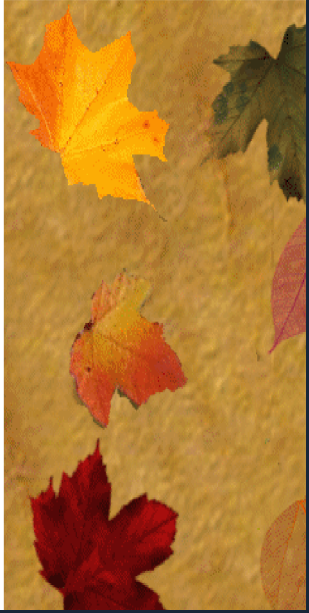


The mission of mathematics education in Utah is to promote student growth and learning in mathematics in order to prepare students to thrive and contribute in the global economy of the 21<sup>st</sup> Century.



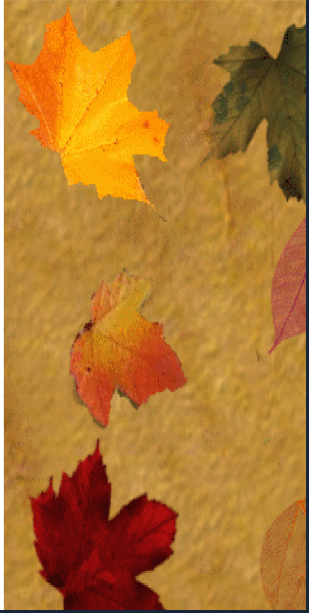
# Some History

- Utah Mathematics Core 2007
- NGA & CCSSO
- USBE approved CCSS in August
- USOE decision to implement ELA in 2011, math in cohorts
- USBE approved the International Pathway in October (1<sup>st</sup> & 2<sup>nd</sup> reading)



# They :

- Are aligned with college and work expectations
- Include rigorous content *and* application of knowledge through high-order skills
- Build upon strengths and lessons of current state standards
- Are internationally benchmarked, so that all students are prepared to succeed in our global economy and society
- Are evidence and/or research based

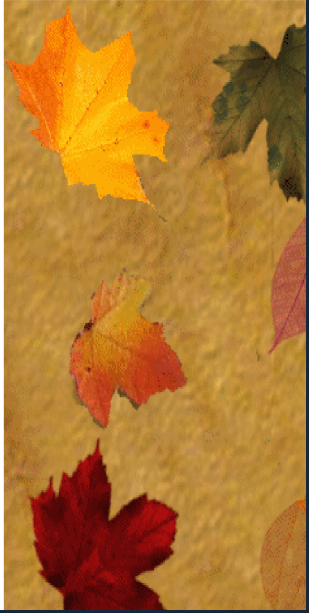


# Why is this important?

- Each state has its own set of standards
  - Students in each state are learning to different levels
- Common standards can promote equal access to an excellent education
  - Independent of zip code
- Students must be prepared to compete with students from around the world

	2010-2011

	K	1	2	3	4	5	6	7	8	9	10	11			
2010-2011	1. Decisions on additions to standards. 2. Mapping: Develop curriculum framework 3. Ancillary materials & information. 4. Course Development 5. Performance Expectations 6. Credit and Graduation Pathways 7. Interventions, Advancement, ELL Learners 8. Design assistance and input. 9. Articulation with IHE.												CRT		
2011-2012	1. Continue design activities 2. Core Academy focused on mathematics 3. Professional development for administrators, teachers, other stakeholders 4. Spring: Public comment and adoption of new core curriculum						Professional Development and			Professional Development and			CRT		
2012-2013	Professional Development and Implementation												CRT		
2013-2014													CRT/Pilot		
2014-2015															



# Instructional Materials

- Grades K-8 used CCSS for fall review
- USOE is currently having conversations with publishers regarding CCSS materials
- Don't forget about electronic resources



# Draft of Instructional Support Framework

## Ratios and Proportional Relationships

7

**Cluster Title:** *Analyze proportional relationships and use them to solve real-world and mathematical problems.*

**Standard:** Compute unit rates associated with ratios of fractions, including ratios of lengths, areas and other quantities measured in like or different units. *For example, if a person walks  $\frac{1}{2}$  mile in each  $\frac{1}{4}$  hour, compute the unit rate as the complex fraction  $\frac{1/2}{1/4}$  miles per hour, equivalently 2 miles per hour.*

### Concepts and Skills to Master

- Understand the concept of a unit rate
- Know how to express unit rates using multiple representations
- Compute a unit rate using fractions

### Critical Background Knowledge

- How to find unit rates (If Eliza drives 400 miles in 8 hours, what is her average rate?)
- Division of complex fractions Ex:  $\left( \frac{\frac{1}{2}}{\frac{2}{3}} \right)$

### Suggested Instructional Strategies

Write given ratios as unit rates.  
Use grocery store ads to find unit rates for various products.  
Use ratios of real-life and model figures to determine scale factors.

### Resources

This is where we would put links to UEN lessons or video examples

### Sample Formative Assessment Tasks

#### Skill-based Task

If the temperature is rising  $\frac{1}{5}$  degree each  $\frac{1}{2}$  hour, what is the increase in temperature expressed as a unit rate?

#### Problem Task

John mows  $\frac{1}{3}$  of a lawn in 10 minutes. Marcia mows  $\frac{1}{4}$  of a lawn in 6 minutes. Who is mowing faster? How much faster?

## Common Core Curriculum Map

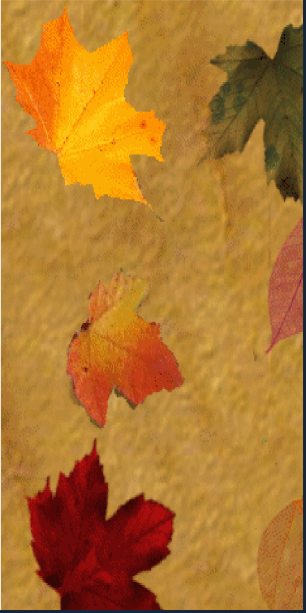
	<p>3. Draw polygons in the coordinate plane given coordinates for the vertices; use coordinates to find the length of a side joining points with the same first coordinate or the same second coordinate. Apply these techniques in the context of solving real-world and mathematical problems.</p> <p>4. Represent three-dimensional figures using nets made up of rectangles and triangles, and use the nets to find the surface area of these figures. Apply these techniques in the context of solving real-world and mathematical problems. (Exists in 2007 Utah Math Core 5<sup>th</sup> grade)</p>
Statistics and Probability	<p><b>Develop understanding of statistical variability.</b></p> <p>1. Recognize a statistical question as one that anticipates variability in the data related to the question and accounts for it in the answers. <i>For example, "How old am I?" is not a statistical question, but "How old are the students in my school?" is a statistical question because one anticipates variability in students' ages.</i></p> <p>2. Understand that a set of data collected to answer a statistical question has a distribution which can be described by its center, spread, and overall shape.</p> <p>3. Recognize that a measure of center for a numerical data set summarizes all of its values with a single number, while a measure of variation describes how its values vary with a single number.</p> <p><b>Summarize and describe distributions.</b></p> <p>4. Display numerical data in plots on a number line, including dot plots, histograms, and box plots. (New forms of data displays)</p> <p>5. Summarize numerical data sets in relation to their context, such as by:</p> <ol style="list-style-type: none"> <li>Reporting the number of observations.</li> <li>Describing the nature of the attribute under investigation, including how it was measured and its units of measurement.</li> <li>Giving quantitative measures of center (median and/or mean) and variability (interquartile range and/or mean absolute deviation), as well as describing any overall pattern and any striking deviations from the overall pattern with reference to the context in which the data were gathered.</li> <li>Relating the choice of measures of center and variability to the shape of the data distribution and the context in which the data were gathered.</li> </ol>
Comments	

Black – Similar to 2007 Utah Math Core

Green – New

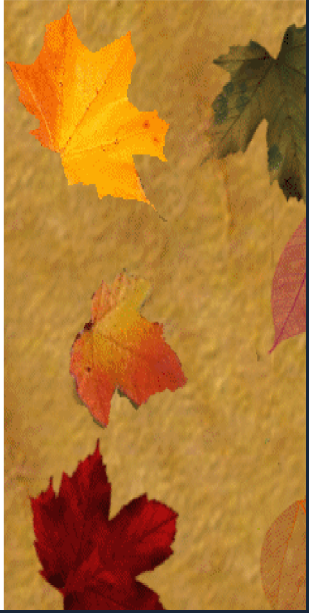
Red – Moved to another grade – indicate grade – comments only

Blue – Concept is no longer in the elementary core – comments only



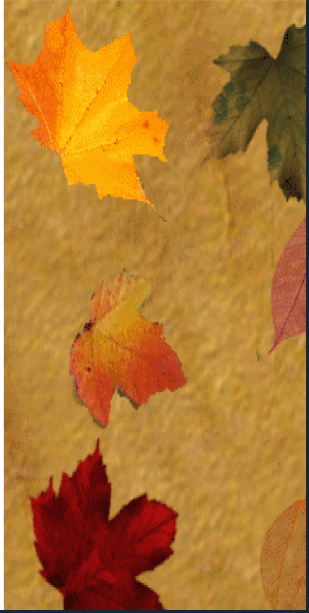
Are there issues or supports  
we have overlooked?





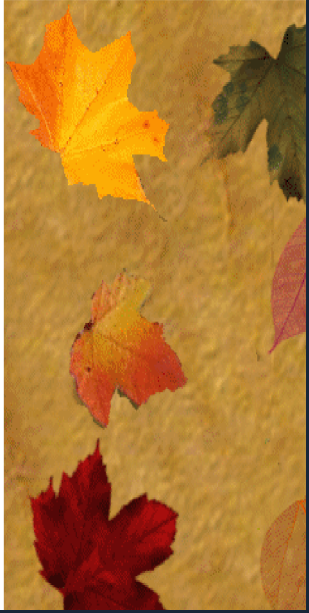
# What do students learn by studying mathematics?





# Mathematical Practice

- Make sense of problems and persevere in solving them.
- Reason abstractly and quantitatively.
- Construct viable arguments and critique the reasoning of others.
- Model with mathematics.
- Use appropriate tools strategically.
- Attend to precision
- Look for and make use of structure.
- Look for and express regularity in repeated reasoning.



# Standards for Understanding and Skill



# Changing Our Vocabulary

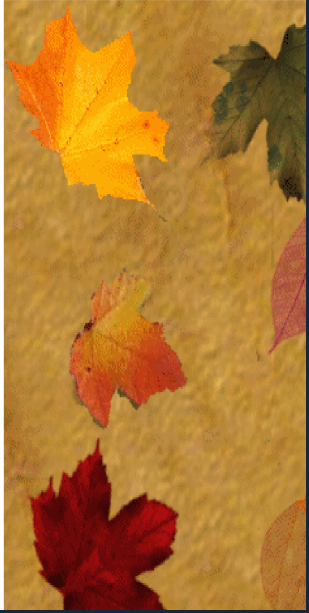
**Represent and solve problems involving addition and subtraction.**

2. Solve word problems that call for addition of three whole numbers whose sum is less than or equal to 20, e.g., by using objects, circles, and equations with a symbol for the unknown number to represent the problem.



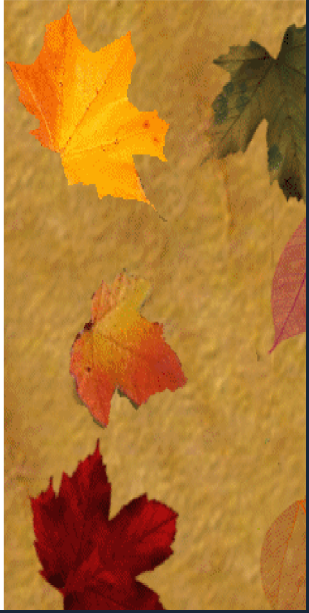
# Analysis of Core

- Major ideas at each grade level
- What is especially important?
- What might be new?
- What is missing?



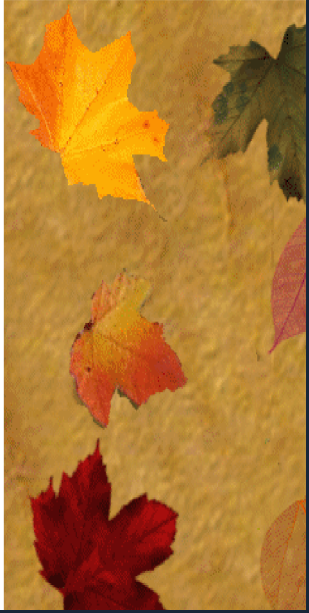
# Kindergarten

- Representing, relating, and operating on whole numbers, initially with sets of objects.
- Describing shapes and space.



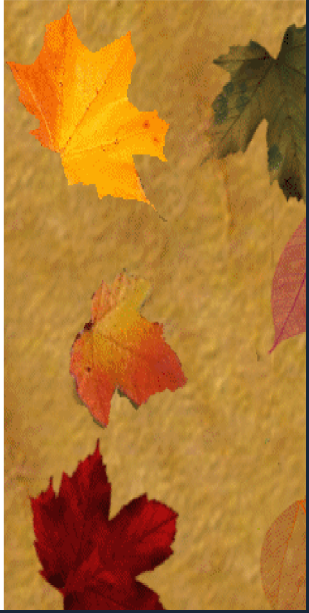
# Grade 1

- Developing an understanding of addition, subtraction, and strategies for addition and subtraction with 10
- Developing understanding of whole number relationships and place value, including grouping tens and one
- Developing understanding of linear measurement and measuring lengths as iterating length units
- Reasoning about attributes of, and composing and decomposing geometric shapes



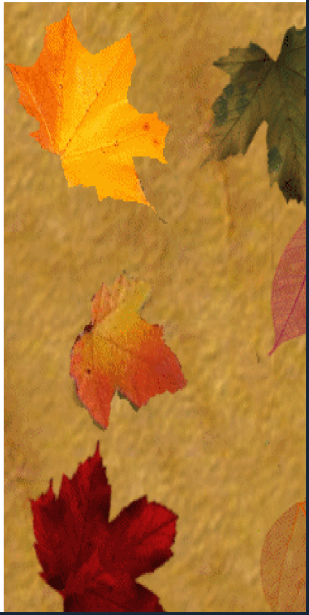
## Grade 2

- Extending understanding of base-ten notation
- Building fluency with addition and subtraction
- Using standard units of measure
- Describing and analyzing shapes



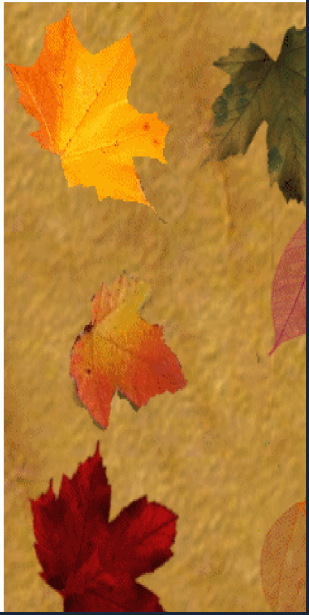
## Grade 3

- Developing understanding of multiplication and division and strategies for multiplication and division within 100
- Developing understanding of fractions, especially unit fractions
- Developing understanding of the structure of rectangular arrays and of area
- Describing and analyzing two-dimensional shapes



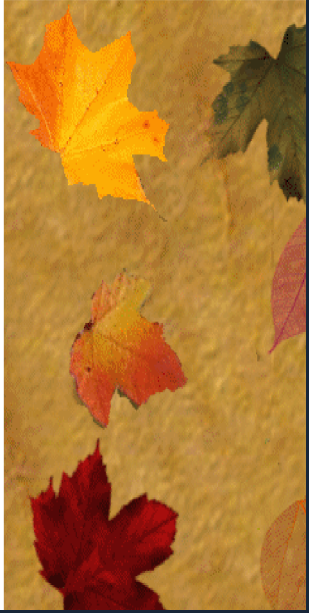
## Grade 4

- Developing understanding and fluency with multi-digit multiplication, and developing understanding of dividing to find quotients involving multi-digit dividends
- Developing an understanding of fraction equivalence, addition and subtraction of fractions with like denominators, and multiplication of fractions by whole numbers
- Understanding that geometric figures can be analyzed and classified based on their properties, such as having parallel sides perpendicular sides, particular angle measures and symmetry.



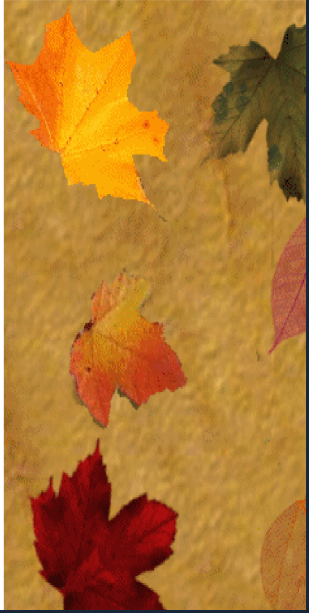
# Grade 5

- Developing fluency with addition and subtraction of fractions, and developing understanding of multiplication of fractions and of division of fractions in limited cases
- Extending division to 2-digit divisors, integrating decimal fractions into the place value system and developing understanding of operations with decimals to hundredths, and developing fluency with whole number decimal operations
- Developing understanding of volume.



# Grade 6

- Connecting ratio and rate to whole number multiplication and division and using concepts of ratio and rate to solve problems
- Completing understanding of division of fractions and extending the notion of number to the system of rational numbers, including negative numbers
- Writing, interpreting, and using expressions and equations
- Developing understanding of statistical thinking



# Grade 7

- Developing understanding of and applying proportional relationships
- Developing understanding of operations with rational numbers and working with expressions and linear equations
- Solving problems involving scale drawings and informal geometric constructions, and working with two- and three-dimensional shapes to solve problems involving area, surface area, and volume
- Drawing inferences about populations based on samples